LISTING OF CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) An encoding device comprising:

two-dimensional Haar wavelet transforming means for extracting, as a signal block, signals of 2m × 2m (m being an integer: m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform ~~dividing~~ a two-dimensional Haar wavelet ~~signal into subbands as a plurality of frequency regions in a predetermined signal scanning sequence to~~ transform to the signal block ~~a predetermined number of the two-dimensional signals into a predetermined number of coefficients~~;

coefficient extracting means for, whenever said two-dimensional Haar wavelet transforming means performs the ~~transforms a predetermined number of~~ two-dimensional Haar wavelet transform ~~signals into a predetermined number of coefficients in the course of the transform process~~, extracting, as coefficient sets, LH, HL and HH coefficients belonging to same spatial coordinates from ~~sets of AC-component coefficients from the~~ coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting m coefficient sets ~~for every predetermined number of sets of coefficients which belong to a same hierarchy and a same spatial position~~;

coefficient encoding means for encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order ~~the thus encoded coefficient sets in a sequence the coefficient sets were extracted~~ in the same hierarchy to generate a code sequence of a high-frequency subband whenever the coefficient extracting means outputs the m coefficient sets;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband; and

code output means for outputting the code sequence of the lowest-frequency subband, and ~~sequentially~~ outputting, from a low-frequency hierarchal order, the code sequence of the high-frequency subband generated by said coefficient encoding means.

2. (Previously Presented) An encoding device according to claim 1, wherein said predetermined signal scanning sequence represents a sequential order of scan lines of the two-dimensional signal, and said coefficient extracting means sequentially extracts a predetermined number of coefficient sets at a time in a scan line direction of the two-dimensional signal.

3. (Original) An encoding device according to claim 1, characterized in that said coefficient extracting means sequentially extracts coefficient sets one by one.

4. (Original) An encoding device characterized by comprising:

element extracting means for sequentially extracting $2m \times 2$ (m is an integer: $m \geq 1$) spatially adjacent elements from a two-dimensional signal;

two-dimensional Haar wavelet transforming means for dividing the $2m \times 2$ elements into a plurality of subband coefficient sets;

coefficient encoding means for encoding and concatenating the AC-component coefficient sets obtained by transform by said two-dimensional Haar wavelet transforming means, and generating a code sequence of a high-frequency subband;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband, and generating the code sequence of the lowest-frequency subband; and

code output means for outputting the code sequence of the lowest-frequency subband, and sequentially outputting the code sequence of the high-frequency subband generated by said coefficient encoding means.

5. (Previously Presented) An encoding device according to claim 1, characterized in that

each coefficient comprises a plurality of components, and

said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each component.

6. (Previously Presented) An encoding device according to claim 4, characterized in that

each coefficient comprises a plurality of components, and

said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each component.

7. (Previously Presented) An encoding device according to claim 1, characterized in that

each coefficient comprises a plurality of components, and

said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each coefficient.

8. (Previously Presented) An encoding device according to claim 4, characterized in that

each coefficient comprises a plurality of components, and

said coefficient encoding means encodes each component of a coefficient, and generates a code by concatenating a code of each coefficient.

9 – 21 (Cancelled)

22. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient thinning map generating means sets the resolution on the basis of the changing period, and generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said coefficient extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

23. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient thinning map generating means sets the resolution on the basis of the changing period, and generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said element extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

24. (Withdrawn) An encoding device according to claim 22, characterized in that said coefficient thinning map generating means sets low resolution in a region in which the changing period is long.

25. (Withdrawn) An encoding device according to claim 23, characterized in that said coefficient thinning map generating means sets low resolution in a region in which the changing period is long.

26 – 37 (Cancelled)

38. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy at each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient to quantization accuracy corresponding to a spatial coordinate of the coefficient by referring to the coefficient quantization map, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient quantization map generating means sets the quantization accuracy on the basis of the changing period, and generates a coefficient quantization map in which quantization accuracy of the updated region differs from resolution of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

39. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy corresponding to each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient set to quantization accuracy corresponding to a spatial coordinate of the coefficient set by referring to the coefficient quantization map, and

updated region detecting means for detecting a updated region from a plurality of sequential frames of a sequence of a plurality of frames forming the two-dimensional signal, and obtaining a changing period during which a signal value changes in each partial region from said plurality of sequential frames,

wherein said coefficient quantization map generating means sets the quantization accuracy on the basis of the changing period, and generates a coefficient quantization map in which quantization accuracy of the updated region differs from resolution of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

40. (Withdrawn) An encoding device according to claim 38, characterized in that said coefficient thinning map generating means sets low quantization accuracy in a region in which the changing period is long.

41. (Withdrawn) An encoding device according to claim 39, characterized in that said coefficient thinning map generating means sets low quantization accuracy in a region in which the changing period is long.

42 – 45 (Cancelled)

46. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said coefficient extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

47. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient thinning map generating means for generating a coefficient thinning map in which resolution at each spatial coordinate of the two-dimensional signal is set, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient thinning map in which resolution of the updated region differs from resolution of a region other than the updated region, and

said element extracting means refers to the coefficient thinning map, and extracts coefficients by thinning the coefficients to the resolution set for the coordinate.

48. (Withdrawn) An encoding device according to claim 1, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map which represents quantization accuracy at each spatial coordinate of the two-dimensional signal, coefficient quantizing means for quantizing coefficients to quantization accuracy corresponding to each spatial coordinate of the coordinates with reference to the coefficient quantization map, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient thinning map generating means generates a coefficient quantization map in which quantization accuracy of the updated region differs from quantization accuracy of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

49. (Withdrawn) An encoding device according to claim 4, characterized by further comprising

coefficient quantization map generating means for generating a coefficient quantization map in which quantization accuracy corresponding to each spatial coordinate of the two-dimensional signal is set,

coefficient quantizing means for quantizing a coefficient set to quantization accuracy corresponding to a spatial coordinate of the coefficient set by referring to the coefficient quantization map, and

updated region detecting means for detecting, as a updated region, an overlapping region of a region to be encoded of a preceding frame and a region to be encoded of a succeeding frame of a sequence of a plurality of frames forming the two-dimensional signal,

wherein said coefficient quantization map generating means generates a coefficient quantization map in which quantization accuracy of the updated region differs from quantization accuracy of a region other than the updated region, and

said coefficient encoding means encodes a set of the quantized coefficients.

50. (Currently Amended) A decoding device ~~which sequentially receives coefficients of a plurality of subbands obtained by two-dimensional Haar wavelet transform as a code sequence of the subband, from a code sequence of a lowest-frequency subband to a code sequence of a high-frequency subband, characterized by~~ comprising:

initial coefficient decoding means for receiving a code sequence of a plurality of subband coefficients obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: N = 1), and decoding LL subband coefficients of an Nth hierarchy from the ~~a coefficient of the lowest-frequency subband from a~~ code sequence for all spatial coordinates ~~corresponding to the lowest-frequency subband, and generating a two-dimensional signal of the lowest-frequency subband~~;

coefficient decoding means for decoding an LL subband of an nth hierarchy (n being an integer: 1 = n= N) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: m = 1) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded ~~sets of AC-component coefficients for every predetermined number of sets of coefficients which belong to the same spatial position in a plurality of subbands which belong to a wavelet transform level of the same hierarchy from the high-frequency subband code sequence following the lowest-frequency subband code sequence~~; and

inverse wavelet transforming means for performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy whenever the coefficient sets of the m sets are ~~set is~~ decoded~~, thereby generating the original two-dimensional signal~~.

51. (Original) A decoding device according to claim 50, characterized in that said coefficient decoding means sequentially decodes a predetermined number of coefficient sets at a time in a scan line direction of the two-dimensional signal.

52. (Original) A decoding device according to claim 51, characterized in that said coefficient decoding means sequentially decodes the coefficient sets one by one.

53. (Previously Presented) A decoding device according to claim 52, characterized in that each coefficient comprises a plurality of components, and

said coefficient decoding means decodes each component of a coefficient, and concatenates each component.

54. (Original) A decoding device according to claim 52, characterized in that each coefficient comprises a plurality of components, and said coefficient decoding means decodes each component of a coefficient.

55 – 73 (Cancelled)

74. (Currently Amended) An encoding program embodied on a computer-readable medium for causing a computer to execute the steps of:

extracting, as a signal block, signals of 2m × 2m (m being an integer: m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform a two-dimensional Haar wavelet transform to the signal block ~~dividing a two-dimensional signal into subbands as a plurality of frequency regions in a predetermined signal scanning sequence to transform a predetermined number of the two-dimensional signals into a predetermined number of coefficients by applying a two-dimensional Haar wavelet transform~~;

encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband;

extracting, as coefficient sets, LH, HL and HH coefficients belonging to same spatial coordinates from, ~~whenever said two-dimensional Haar wavelet transforming means transforms a predetermined number of two-dimensional signals into a predetermined number of coefficients in the course of the transform process, sets of AC-component coefficients from the~~ coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting m coefficient sets, whenever said two-dimensional Haar wavelet transform is performed ~~for every predetermined number of sets of coefficients which belong to a same hierarchy and a same spatial position~~;

encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order ~~the thus encoded coefficient sets in a sequence the coefficient sets were extracted~~ in the same hierarchy to generate a code sequence of a high-frequency subband whenever the coefficient extracting means outputs the m coefficient sets; and

outputting the code sequence of the lowest-frequency subband, and ~~sequentially~~ outputting, from a low-frequency hierarchal order, the code sequence of the high-frequency subband.

75. (Previously Presented) An encoding program embodied on a computer-readable medium for causing a computer to execute the steps of:

sequentially extracting $2m \times 2$ (m is an integer: $m \geq 1$) spatially adjacent elements from a two-dimensional signal;

dividing the $2m \times 2$ elements into a plurality of subband coefficient sets by two-dimensional Haar wavelet transform;

encoding and concatenating the AC-component coefficient sets obtained by two-dimensional Haar wavelet transform, and generating a code sequence of a high-frequency subband;

encoding and concatenating a DC component as a lowest-frequency subband, and generating the code sequence of the lowest-frequency subband; and

outputting the code sequence of the lowest-frequency subband, and sequentially outputting the code sequence of the high-frequency subband.

76 –83 (Cancelled)

84. (Currently Amended) A decoding program embodied on a computer-readable medium for causing a computer to execute the steps of:

~~sequentially~~ receiving ~~coefficients~~ a code sequence of a plurality of subband coefficients ~~subbands~~ obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: N = 1) ~~as a code sequence of the subband, from a code sequence of a lowest-frequency subband to a code sequence of a high--frequency subband~~;

decoding LL subband coefficients of an Nth hierarchy from the ~~a coefficient of the lowest-frequency subband from a~~ code sequence for all spatial coordinates ~~corresponding to the lowest-frequency subband, and generating a two-dimensional signal of the lowest-frequency subband~~;

decoding an LL subband of an nth hierarchy (n being an integer: 1 = n= N) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: m = 1) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded ~~sets of coefficients for every predetermined number of sets of coefficients which belong to the same spatial position in a plurality of subbands which belong to a wavelet transform level of the same hierarchy from a high-frequency subband code sequence following the lowest-frequency subband code sequence~~; and

performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy whenever the coefficient sets of the m sets are ~~set is~~ decoded~~, thereby generating the original two-dimensional signal~~.

85. (Currently Amended) A communication terminal characterized by comprising:

image input means;

communicating means for transmitting and receiving an encoded image signal;

two-dimensional Haar wavelet transforming means for extracting, as a signal block, signals of 2m × 2m (m being an integer: m = 1) spatially adjacent elements in a scan line order from an LL subband of a same hierarchy of an image or wavelet to perform a two-dimensional Haar wavelet ~~dividing an image signal to be transmitted, which is input by said image input means, into subbands as a plurality of frequency regions in a predetermined signal scanning sequence to~~ transform to the signal block ~~a predetermined number of the two-dimensional signals into a predetermined number of coefficients~~;

coefficient extracting means for, whenever said two-dimensional Haar wavelet transforming means performs the ~~transforms a predetermined number of~~ two-dimensional Haar wavelet transform ~~signals into a predetermined number of coefficients in the course of the transform process~~, extracting, as coefficient sets, LH, HL and HH coefficients belonging to same spatial coordinates from ~~sets of AC-component coefficients from the~~ coefficients obtained by the two-dimensional Harr wavelet transform, thereby outputting m coefficient sets ~~for every predetermined number of sets of coefficients which belong to a same hierarchy and a same spatial position~~;

coefficient encoding means for encoding the m coefficient sets to obtain codes, and concatenating the codes in the scan line order ~~the thus encoded coefficient sets in a sequence the coefficient sets were extracted~~ in the same hierarchy to generate a code sequence of a high-frequency subband whenever the coefficient extracting means outputs the m coefficient sets;

initial coefficient encoding means for encoding and concatenating a DC component as a lowest-frequency subband to generate a code sequence of the lowest-frequency subband;

code output means for outputting the code sequence of the lowest-frequency subband to said communication means, and ~~sequentially~~ outputting, from a low-frequency hierarchal order, the code sequence of the high-frequency subband generated by said coefficient encoding means to said communication means;

initial coefficient decoding means for receiving a code sequence of a plurality of subband coefficients obtained by two-dimensional Haar wavelet transform of N hierarchies (N being an integer: N = 1), and decoding LL subband coefficients of an Nth hierarchy from the ~~a coefficient of the lowest-frequency subband from a~~ code sequence for all spatial coordinates ~~corresponding to the lowest-frequency subband of the received image signal, and generating an image signal of the lowest-frequency subband~~;

coefficient decoding means for decoding an LL subband of an nth hierarchy (n being an integer: 1 = n= N) for all spatial coordinates, sequentially receiving a code sequence corresponding to LH, HL and HH coefficients of an (n-1)th hierarchy, performing a decoding operation every m sets (m being an integer: m = 1) of the LH, HL and HH coefficients of the (n-1)th hierarchy at a spatially same position in a scan line order, and repeating the decoding operation until all spatial coordinates of the (n-1)th hierarchy are decoded ~~sets of AC-component coefficients for every predetermined number of sets of coefficients which belong to the same spatial position in a plurality of subbands which belong to a wavelet transform level of the same hierarchy from the high-frequency subband code sequence following the lowest-frequency subband code sequence~~;

inverse wavelet transforming means for performing two-dimensional Haar inverse wavelet transform using the decoded LH, HL and HH coefficients of the m sets and the LL subband coefficients of the nth hierarchy at the same spatial coordinates, thereby generating an original image serving as the LL subband of the (n-1)th hierarchy or an LL subband of a 0^{th} hierarchy whenever the coefficient sets of the m sets are ~~set is~~ decoded~~, thereby generating the original received image signal~~; and

image display means for displaying a received image on the basis of the received image signal.